

## Hydraulic Automatic Shutdown Valve

### *Enhances Field Safety and Environmental Control*

Product Developer: Cambria Valve Corporation

#### ► THE PROBLEM

Many types of oilfield operations and safety equipment contain hydraulically-controlled operating systems. For example, high-pressure fracture stimulation treatments, coiled tubing remedial operations, and blowout preventer systems on drilling and workover rigs all rely on hydraulic control systems.

Though these systems generally are sturdy and reliable, they are not completely fail-safe. When an hydraulic control line ruptures, it can endanger the safety of field personnel, create environmental damage, require costly equipment repairs, and cause production downtime.

Oilfield equipment designers and manufacturers have attempted to address this problem in the past by using a device called a two-port automatic shutdown valve. A two-port valve is designed to quickly stop the flow of hydraulic fluid from the failed line. However, this type of valve terminates the flow of fluid abruptly, which can over-pressure the hydraulic system and cause other weak components in the system to rupture.

#### ► THE SOLUTION

Cambria Valve Corporation has developed a three-port Automatic Shutdown Valve (ASDV), which is designed to automatically stop fluid flow through an hydraulic system when a line ruptures and safely redirect the flow to a bypass or redundant system. The ASDV incorporates three ports—inlet, outlet, and bypass. When the ASDV senses a rupture at the outlet port, it immediately diverts flow to the bypass port and blocks flow through the ruptured line. This design prevents the system from over-pressuring and causing further equipment damage.

Operators can apply the ASDV on all types of hydraulically-operated oilfield equipment and safety systems. The ASDV can be configured with visual and audible alarms to annunciate system failures. The valve can also be configured to automatically shut down equipment.

Cambria Valve Corporation and RMOTC tested the ASDV at the RMOTC field testing site (Naval Petroleum Reserve No. 3). The ASDV operated reliably under a range of flow rate and pressure conditions.



*Cambria Valve Corporation's Automatic Shutdown Valve (ASDV) on a truck-mounted hydraulic test bed at RMOTC. The ASDV senses hydraulic control line ruptures and diverts fluid flow through a bypass to prevent system over-pressuring.*

## ► THE BENEFITS

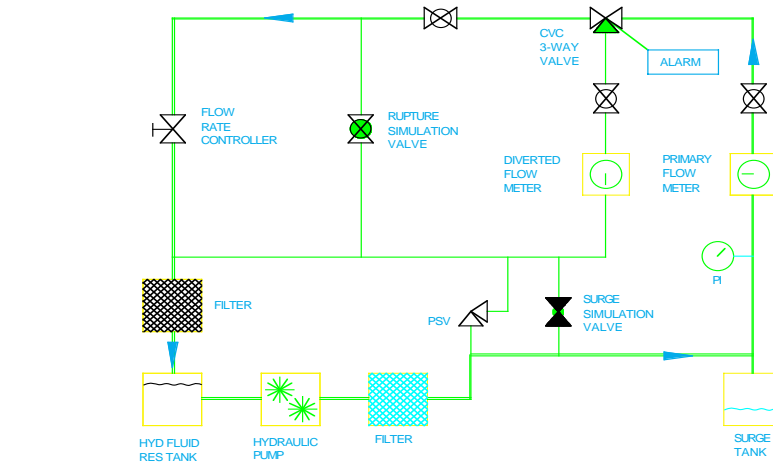
Operators can apply the Cambria ASDV system to all hydraulic equipment used in oilfield operations. The ASDV can provide several benefits:

- Enhanced safety of field personnel because hot, flammable fluids are contained.
- Reduced equipment damage caused by hydraulic system over-pressuring during shutdown.
- Less production downtime caused by hydraulic system failures.
- Greater environmental protection because of elimination of secondary ruptures and hydraulic fluid spills.

## ► THE FIELD PERFORMANCE

Field testing of the ASDV was designed to evaluate the valve's response time, its ability to divert flow without operational failure, and its sensitivity to variances in system flow rate and pressure, which can be caused by abrupt movement of equipment. In tests conducted using Cambria's truck-mounted hydraulic test bed, the ASDV demonstrated effective performance for each of these criteria.

The 3/4 inch, 3-port ASDV was designed for a flow rate of approximately 35 gpm and a pressure of approximately 1,700 psi, which is typical of small hydraulically-



*Schematic of the hydraulic test bed used to test the ASDV. The ASDV blocks "normal" flow through the port hosting the simulated rupture and automatically diverts it to the bypass port.*

operated machinery. Various "normal" flow rates and pressures were established, and then ruptures of the outlet line were simulated. The ASDV blocked "normal" flow through the port hosting the simulated rupture and automatically diverted it to the bypass port.

After establishing the "lower nominal limit" (1,000 psi @ 20 gpm), 20 consecutive tests were run within the nominal ranges of 1,000–1,700 psi and 15–35 gpm. All 20 tests produced response times of three seconds or less. The tests at higher flow rates and pressures shut down the system and diverted the hydraulic fluid in approximately one second. Between tests, the valve was readily reset into operation without remov-

ing it from service.

Surge testing was conducted on the test bed by abruptly varying the flow rate from 10 to 20 gpm using the "surge simulation valve." The valve demonstrated insensitivity to variances in system flow rate and pressure during surge testing. The surging had no effect on the performance of the ASDV for the tested conditions.

## ► THE NEXT STEP

Cambria Valve Corporation also manufactures a 1-1/2 inch valve. New materials are being investigated to reduce weight, and openings have been redesigned for improved flow characteristics. The ASDV system is available in the U.S. and Canada.

## ► FOR MORE INFORMATION:

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